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ABSTRACT

This publication outlines the involvement of the National Aeronautics and Space Administration (NASA) with Historically Black Colleges and Universities (HBCU) programs in aeronautics and space research. NASA aims to assist HBCUs in science, engineering, and technology programs and also to encourage greater participation of minorities in its educational services and research. Contents of this brochure include: (1) NASA's mission, installations and HBCUs (highlighting the major program responsibilities of each of NASA's installations); (2) guidance for proposal submission (recommending an organizational structure and format); (3) student educational and research opportunities (explaining cooperative educational and graduate student researchers programs); (4) faculty opportunities (describing summer fellowships, resident research associateships and the intergovernmental mobility program); and (5) NASA educational services (including the services of the spacemobile, Explorer's program, Math Counts, community involvement programs, mini-courses and workshops for teachers, as well as speakers bureau and publications). A bibliography concerning NASA's research interests, organizational structure, and administrative requirements is also provided. An appended insert lists the HBCU research and training projects held at NASA centers. Projects from 18 colleges and universities are itemized for fiscal year 1984, indicating to prospective proposers the nature of the efforts, funding levels, and student involvement. (ML)

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NASA Initiatives With Historically Black Colleges & Universities

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NASA Initiatives With Historically Black Colleges & Universities

NASA

National Aeronautics and Space Administration

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Insert—NASA Research Projects at HBCU's

Astronauts repairing satellite in space

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

Foreword

This brochure would not be complete without acknowledging the contributions made by Dr. Hans Mark while he was NASA Deputy Administrator from July 1981 to September 1984.

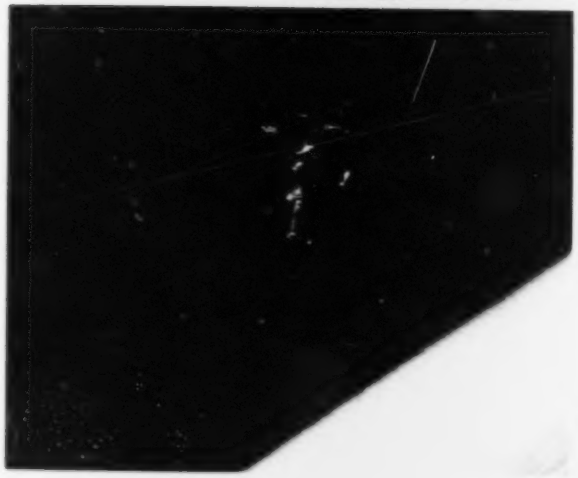
Along with Administrator James M. Beggs, Dr. Mark devoted his energy and drive to the successful implementation of Executive Order 12320 for the benefit of the HBCU's and NASA.

Dr. Mark is at his new post of Chancellor of the University of Texas System at Austin, Texas.

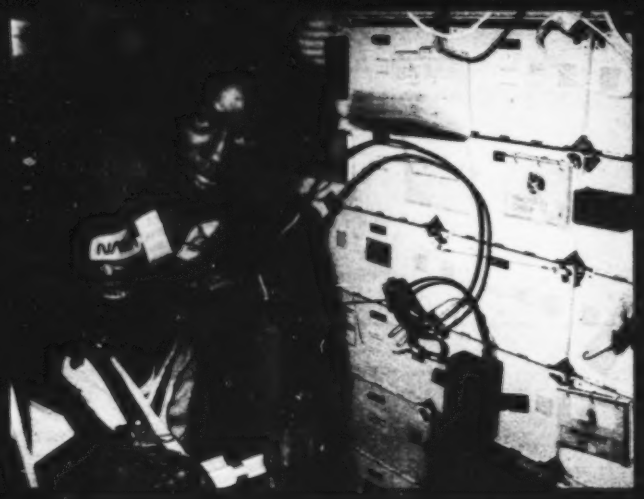
We are grateful and wish him well.

Harriett G. Jenkins

Harriett G. Jenkins
Assistant Administrator for
Equal Opportunity Programs



Astronaut performing extravehicular activity



Astronaut Guion S. Bluford

Astronaut Ronald E. McNair

Astronaut Frederick D. Gregory

Astronaut Charles F. Bolden, Jr.

The National Aeronautics and Space Administration (NASA) has traditionally encouraged Historically Black Colleges and Universities (HBCU's) to participate in the Nation's aeronautics and space program. NASA will continue its relationships and involvement with HBCU's to promote a growing, independent HBCU research program and to achieve broad cooperation between HBCU's and NASA in-house research groups. This will be a key initiative in our support of the future NASA programs.

This NASA practice is in keeping with the President's Executive Order 12320 of September 15, 1981, which is designed to achieve a significant increase in the participation by HBCU's in federally sponsored programs. It is also designed to further the policy and purposes of the National Aeronautics and Space Act of 1958. This initiative has two purposes. One, to help achieve research and technology objectives through strengthened capabilities in research, aerospace, science, engineering and management at HBCU's. Two, to develop a larger pool of minority graduate researchers by encouraging the participation of students and faculty of HBCU's in NASA research and in NASA's educational opportunities and services.

An innovative and skilled technical and scientific work force is the key to technological progress now and in the years to come. For more than two decades, NASA has worked to build a reservoir of talented people to help keep our economy going and growing. We will continue to open the doors of opportunity to HBCU's and to all who share our goals in the national interest.

James M. Beggs
Administrator

NASA Administrator, James M. Beggs

NASA's mission includes all matters pertaining to the civilian space and aeronautical research activities of the Nation. Its work includes basic and applied research for the expansion of human knowledge of phenomena in the atmosphere and space; the improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical and space vehicles; the development and operation of vehicles capable of carrying instruments, equipment, supplies, and living organisms through space; and the preservation of the role of the United States as a leader in aeronautical and space activities within and outside the atmosphere.

NASA is operating the Space Shuttle to continue the exploration of space and increase the utilization of the resources of Earth. The agency is also actively involved in making present and future civil aircraft safer, quieter, less polluting, and more useful and economical; developing scientific instruments to study the Earth, the Sun and the planets; and continuing to push to their farthest reaches many fields of space and aeronautical technologies.

NASA is now developing a space station program as the next major initiative in space. Attention is focusing upon mission requirements; system architecture, requirements and characteristics; technology options; and space shuttle operations. With the Space Shuttle now an operational reality, a permanent facility in orbit will enable the U.S. to enjoy the full benefits of space. A space station will serve the interests of science, commerce and the national defense.

NASA's mission is largely accomplished through its research and flight centers. The initiatives and cooperation of the center directors, staff, managing scientists and engineers and their counterparts in the HBCU's result in projects mutually beneficial to NASA and HBCU's. NASA strongly supports the direct involvement of students in research efforts; thereby, students gain additional motivation for research careers, faculty student interaction is increased, and students acquire valuable employable skills.

NASA also encourages partnerships of NASA, HBCU's and the private sector as a means to further strengthen the HBCU infrastructure.

View of the Earth's sphere from Apollo 17.

Headquarters (HQs)

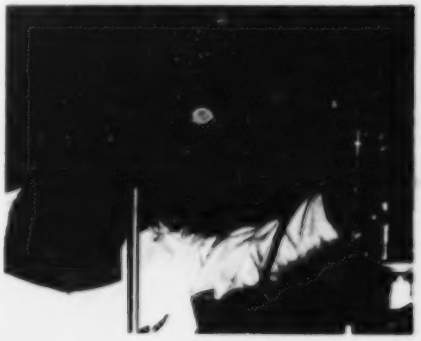
National Aeronautics and Space Administration
Washington, DC 20546

Administrator: Mr. James M. Beggs
202 453-1000

Howard University students studying photochemical production processes of cometary radicals

Headquarters exercises management over the space flight centers, research centers, and other installations which comprise the National Aeronautics and Space Administration, including the determination of programs and projects; establishment of management policies; procedures and performance criteria; setting of personnel management objectives and equal opportunity goals; evaluation of progress; and review and analysis of all phases of the aeronautical and space programs. Broad program areas are: space transportation systems and operations, space science, space terrestrial applications, aeronautics and space technology, and space tracking and data systems. Functional management is exercised with respect to all phases of administration. The Headquarters is also responsible for sponsorship and participation in international programs for space exploration, public affairs, and technical information programs.

Jackson State University professor conducting laser experiments on ions.



Aerial view of NASA headquarters, Washington, DC.

Ames Research Center (ARC)

National Aeronautics and Space Administration
Moffett Field, CA 94035

Dryden Flight Research Facility (DRFF)

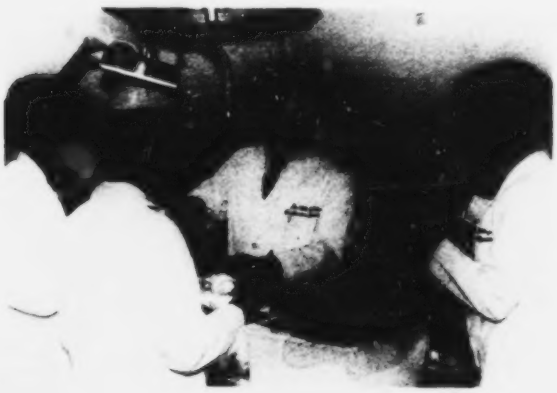
National Aeronautics and Space Administration
P.O. Box 273 Edwards, CA 93523

Director: Dr. William F. Ballhaus, Jr.
415 965-5000

NASA scientist using biofeedback to prevent motion sickness

Ames Research Center conducts basic and applied research in physical and life science areas of vital importance to the advancement of aeronautics and space technology. The center's major program responsibilities are concentrated in fundamental aerodynamics, computational fluid dynamics, powered-lift aircraft technology, rotorcraft technology, flight simulation, aeronautical and space human factors, flight research, airborne science and applications, space sciences, life sciences, and support to military, aerospace industry, and universities. The center has many state-of-the-art research facilities including NASA's largest scientific computing complex. In addition to many specialized scientific and engineering research laboratories, Ames has the world's highest fidelity flight simulators, and major aerodynamic and aerothermodynamic facilities including the world's largest wind tunnel. The Dryden Flight Research Facility at Edwards, California, provides flight test capability for NASA flight research projects supporting aeronautics and space technology programs.

Tuskegee Institute and NASA scientist studying cellular damage from irradiation



Florida A&M University students and professor engaging in hypertension research

Goddard Space Flight Center (GSFC)

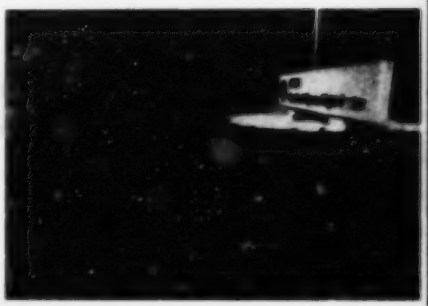
National Aeronautics and Space Administration
Greenbelt, MD 20771

Wallops Flight Facility

National Aeronautics and Space Administration
Wallops Island, VA 23337

Director: Dr. Noel W. Hinners
301-344-7000

Goddard Space Flight Center conducts research and is responsible for all the facets of remotely controlled earth orbiting and sounding rocket missions. This includes instrument design and development, spacecraft engineering, satellite tracking, communications, data acquisition, and data interpretation. Active programs are in process in essentially all the theoretical and experimental space sciences and global earth observation disciplines, included are optical, ultra-violet, infrared, radio, high energy, and solar astronomy; atmospheric, magnetospheric interplanetary and cometary physics; meteorology; hydrology; oceanography; communications; and earth physics. Goddard has also been responsible for major advances in communication, weather and climate research, earth resources, space physics and space astronomy. These accomplishments were achieved concurrent with unprecedented world-wide ground support roles for the Mercury, Gemini, Apollo, Skylab, and Space Shuttle manned flight missions.



Entrance to Goddard Space Flight Center.

Morgan State University professor and students calibrating films flown on space shuttle.

Lyndon B. Johnson Space Center (JSC)

National Aeronautics and Space Administration
Houston, TX 77058

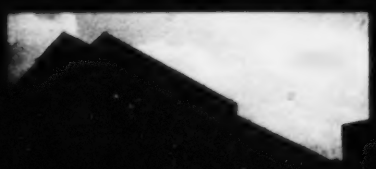
Director: Mr. Gerald D. Griffin
713-483-3111

Prairie View A&M University student studying laser targets

Lyndon B. Johnson Space Center manages the development and operation of the Space Shuttle, a manned space transportation system which has the ability to inexpensively transport a variety of payloads into orbit. The Shuttle is designed to reduce the cost and increase the effectiveness of using space for commercial, scientific, and defense needs. This center is responsible for development, production, delivery and flight operation of the Orbiter vehicle, that portion of the Space Shuttle which is designed to take crew and experiments into space, place satellites in orbit, retrieve ailing satellites, etc. The Shuttle crew (up to seven people) includes pilots, mission specialists and payload specialists. Crew personnel (other than payload specialists) are recruited, selected and trained by this Center. It is also responsible for design, development, and testing of space flight payloads and associated systems for manned flight; for planning and conducting manned spaceflight missions; and for directing medical, engineering, and scientific experiments that are helping man understand and improve his environment.

The Johnson Space Center is the lead center for the Space Station program. The lead center is responsible for overall systems engineering for the program, the selection of a configuration and the integration of all elements into an operating system which is responsive to the customer needs.

Prairie View A&M University student evaluating lithium batteries



Prairie View A&M University Engineering Building

Prairie View A&M University students and professor engaging in electronic systems research

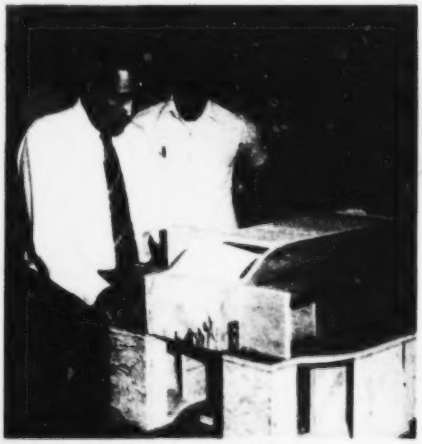
Aerial view of Johnson Space Center

John F. Kennedy Space Center (KSC)

National Aeronautics and Space Administration
Kennedy Space Center, FL 32899

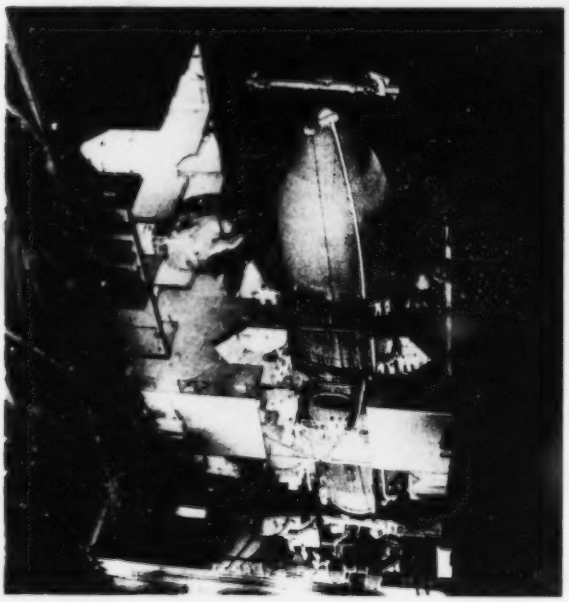
Director: Mr. Richard G. Smith
305/867-7110

John F. Kennedy Space Center launched the manned space shuttle vehicles and payloads. KSC is NASA's major launch operation facility. Principal activities at KSC involve technical management and support of launch operations through systems contractors, complete planning, design, development, and utilization of launch facilities and coordination of activities related to payload hardware. KSC also is responsible for NASA's launch programs involving expendable vehicles. Cape Canaveral Air Force Station, adjacent to KSC, and NASA's Western Test Range at Vandenberg Air Force Base, California, provide facilities and support services for launching scientific, communications, and weather satellites by expendable rocket vehicles.



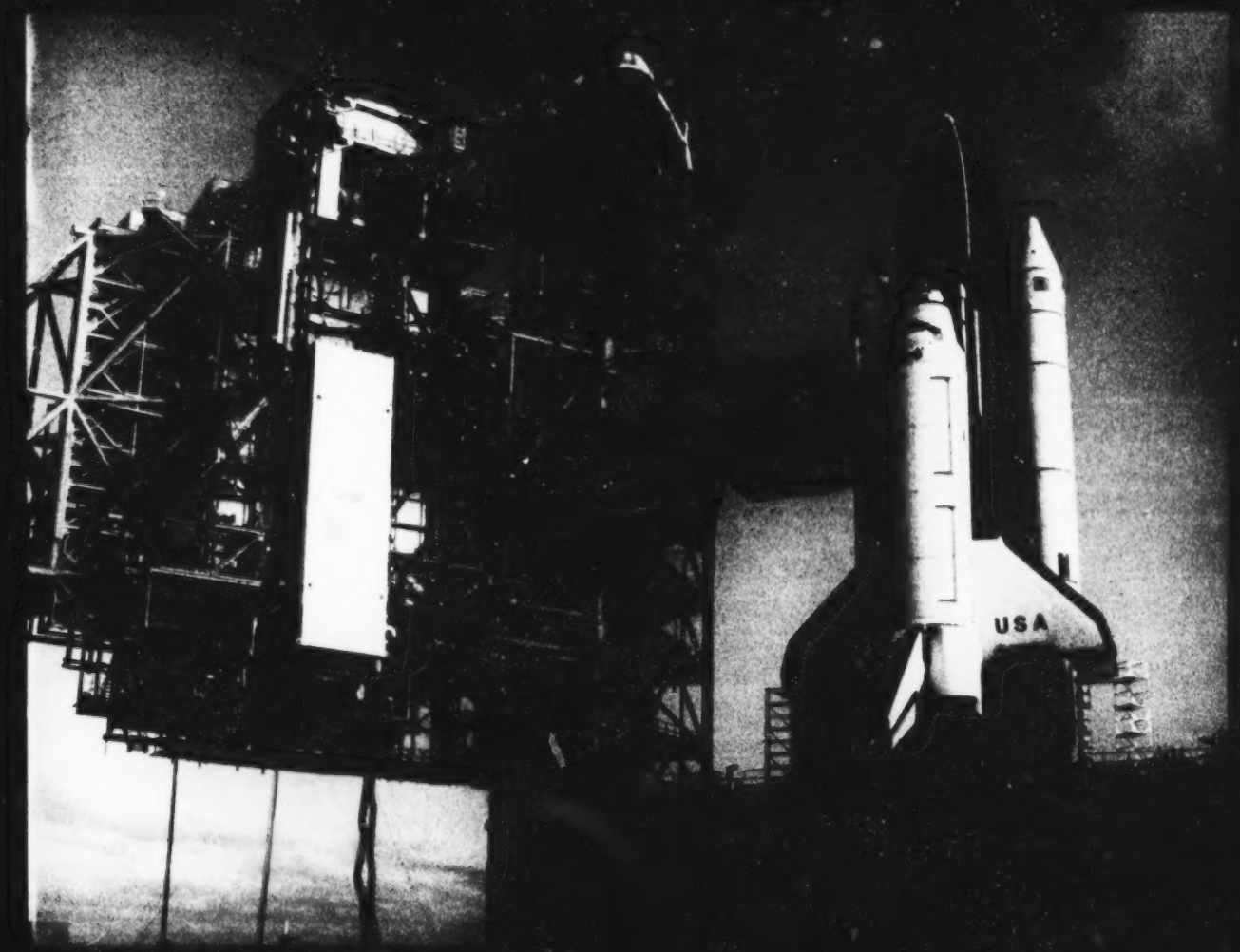
Tuskegee Institute professor and student researching polymeric materials.

Florida A&M University student engaging in life sciences research.

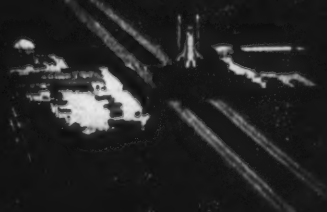


The external fuel tank (ET) for the third Space Shuttle mission (STS-3) is lowered into place on the Mobile Launcher Platform.

Space Shuttle Orbiter in the assembly bay



Preparation of Space Shuttle for launch



Space Shuttle moving to launch facility

Langley Research Center (LaRC)

National Aeronautics and Space Administration
Hampton, VA 23665

Director: Dr. Donald P. Hearth
804/865-2000

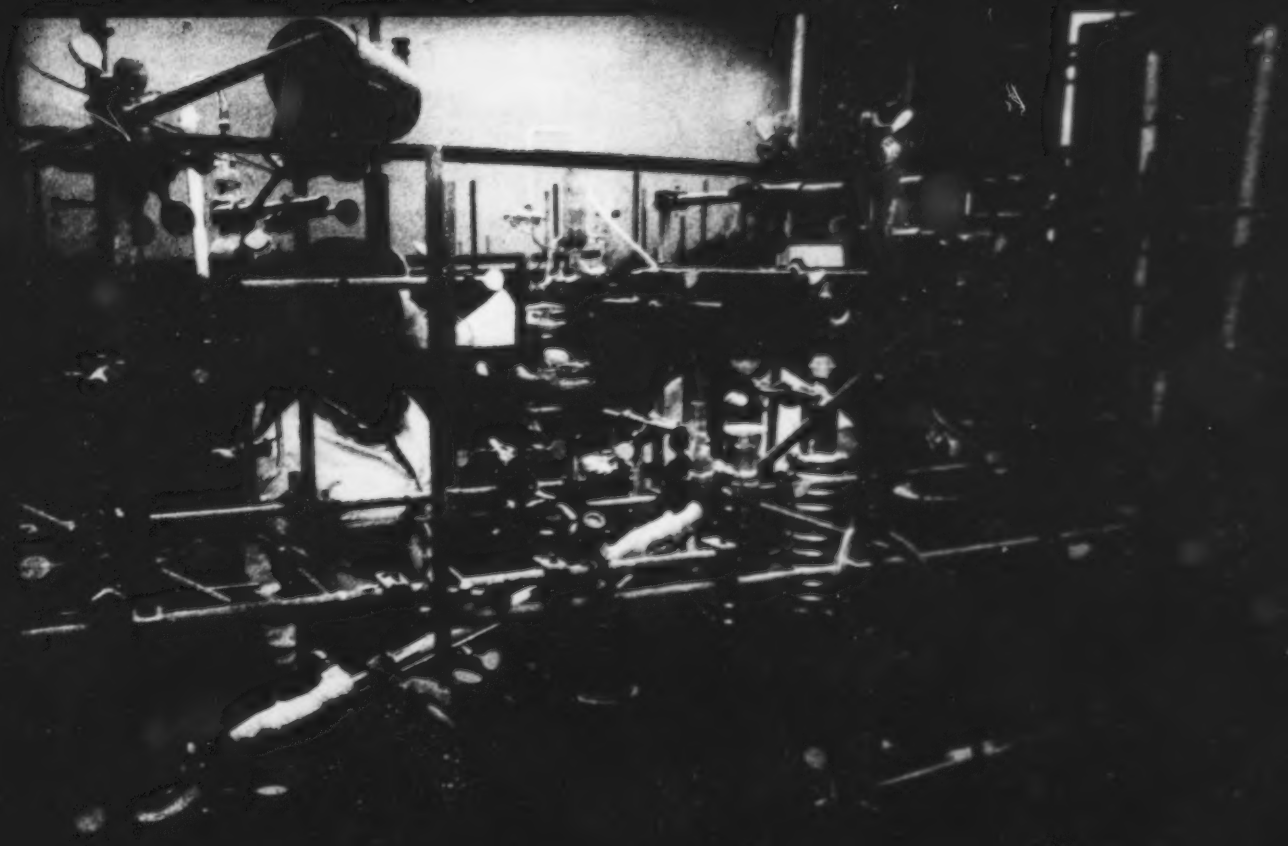
Hampton University student participating in materials research project at Langley Research Center.

Langley Research Center conducts research and technology development in aeronautics and space the application of technology to environmental quality and monitoring. Research and technology efforts are carried out in: aeronautical research in all speed ranges, aircraft stability and control, guidance and navigation, fluid and flight mechanics, certain aspects of aircraft propulsion, drag reduction, air-foil research, flight safety, wake vortex research, general aviation, computer aided structural design and analysis, fatigue and fracture, structural materials and manufacturing technology, composite materials, aeroelasticity and structural dynamics, structural concepts for aeronautical and space vehicle systems, high-temperature structures, aircraft noise reduction, aircraft landing loads and motions, advanced fault-tolerant systems, active controls for aircraft, space guidance and control, advanced electronic components and devices, applied mathematics and computer sciences, earth applications flight experiments, technology for remote sensing of air and water quality, development of mathematical models of air and water pollution dispersion, and advanced aerospace transportation systems. Studies are also conducted in the areas of energy-efficient aircraft, hydrogen-fueled aircraft, laminar-flow control, supersonic cruise aircraft, and space transportation system payloads and experiments.

North Carolina A&T University professor and students experimenting with plasma depositioned thin films.

Atlanta University professor and his students doing computer research at Langley Research Center.

North Carolina A&T State University student conducting solid state electronics research



Atlanta University professor and student working on NASA sponsored research

Aerial view of Langley Research Center's National Transonic Facility

in solid state
electronics
laboratory

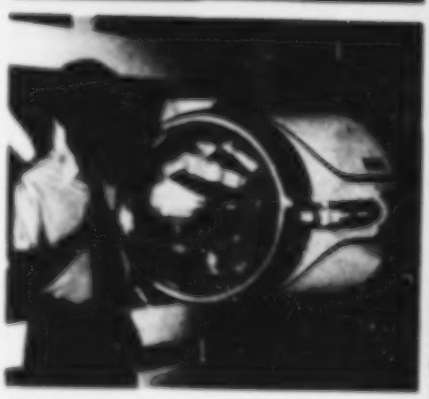
Lewis Research Center (LeRC)

National Aeronautics and Space Administration
21000 Brookpark Road
Cleveland, OH 44135

Director: Mr. Andrew J. Stofan
216-433-4000

Lewis Research Center directs research and technology development for aircraft propulsion, space propulsion, space power generation, satellite communications, and in-space experimentation. Aeronautics research and technology development at Lewis is aimed principally at advancing propulsion technology for clean, quiet, high efficiency aircraft engine systems. Propulsive lift concepts are also being explored and refined for aircraft needed for short travel transportation. Research and technology work for space propulsion emphasizes high energy chemical rocket systems for upper stages and other engines for spacecraft use, including both chemical and electronic rocket systems. Lewis manages the Atlas Centaur launch vehicle, which is used for placing scientific and communication payloads in space, and is developing a modified Centaur stage for use with the Space Shuttle for the Galileo mission and other geosynchronous orbit and planetary missions. Space power technology at Lewis includes work on photovoltaic systems, fuel cells, solar dynamic power systems, and energy storage systems. Because of this expertise, Lewis has been assigned the lead responsibility for developing the power system for the nation's first permanently manned space station. Lewis has extensive capability in materials and structures research, which supports all the other programs, and has a growing program in the area of in-space experiments to be performed by the Space Shuttle or ultimately on the Space Station. Lewis is NASA's lead center for satellite communications technology. Current work is focused on the 30/20 gigahertz spectrum to provide increased communications capacity to meet future needs.

Howard University engineering professor on silicon carbide research



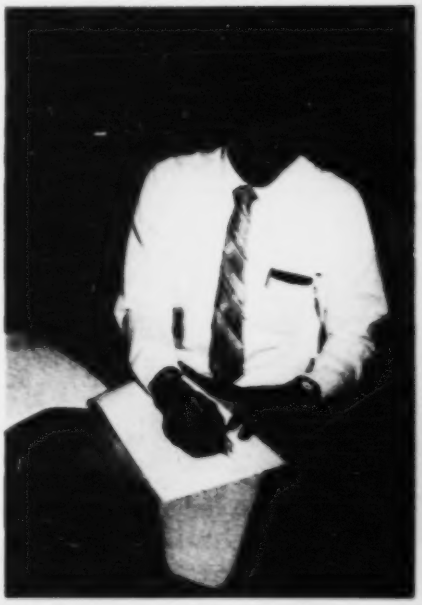
NASA engineer inspecting engine in propulsion test facility

George C. Marshall Space Flight Center (MSFC)

National Aeronautics and Space Administration
Marshall Space Flight Center, AL 35812

Director: Dr. William R. Lucas
205-453-2121

George C. Marshall Space Flight Center designs and develops space transportation systems, orbital systems, scientific and applications payloads, and other systems for present and future space exploration. It is the principal center within NASA for rocket propulsion systems; for the design and development of manned vehicle systems; for Spacelab mission management and payload definition; for design and development of large, complex, and specialized automated spacecraft; and development of the space processing activity base. MSFC is a primary center within NASA for the development and processing of science and applications experiments. In addition, the center conducts a vigorous research and technology program and is deeply involved in the study and definition of future programs, including significant roles contributing to the development of large, complex space structures, space propulsion systems, materials engineering, materials processing in space, power systems, guidance and control, fundamental electronics, and payload systems analysis and integration.



Alabama A&M University scientist investigating high energy cosmic rays.

Fisk University student doing research on zero gravity grown crystals.

National Space Technology Laboratories (NSTL)

National Aeronautics and Space Administration
NSTL Station, MS 39529

Director: Mr. I. Jerry Hlass
601 688-2211

National Space Technology Laboratories supports testing of Space Shuttle Main Engine and Main Propulsion Test Article. NASA's other major roles at the South Mississippi Space Center include basic and applied research in systems development and evaluation of remote sensing technologies and management of the total center in support of other federal and state resident agencies engaged primarily in environmental and oceanographic research.

Closeup view of shuttle's main engine being tested

Alabama A&M University scientist and student conducting remote sensing research on water resources.

General Information

The unsolicited proposal is the primary assessment mechanism by which the university is able to match its research capabilities and interests with NASA's research needs to meet the NASA's mission. Proposals are evaluated on the basis of (1) their intrinsic scientific and or engineering merit; (2) their potential contribution to NASA's mission; and (3) availability of funds. NASA supports accepted projects through single- or multi-year grants, through cooperative agreements or contracts.

Individuals contemplating the development of a proposal for submission to NASA may wish to review the "NASA Research and Technology Objectives and Plans (RTOP) Summary," a compilation of research currently in progress throughout NASA. By using the RTOP to determine and to identify the Agency's research needs and its technical monitors, HBCU researchers can initiate communications with NASA technical personnel prior to the proposal development process and throughout. Information for obtaining the "RTOP Summary" may be found in the *Bibliography*.

Instruments of Agreement

Grants

Grants are based on the grantee's proposal and contain a minimum of express conditions binding the grantee. Grants are NASA's preferred funding instrument for support of basic research of interest to the Agency.

Cooperative Agreements

Cooperative agreements are similar to grants in most terms and conditions. The distinction is that cooperative agreements contain a special provision stating the nature of the relationship between NASA and the recipient. In a cooperative agreement it is anticipated that there may be substantial NASA involvement during performance of the effort; that is, the recipient can expect NASA collaboration or participation in project management.

Contracts

Contracts are used when the effort, usually of a highly applied or developmental nature, is primarily for NASA's direct use or benefit. They are most commonly used for onboard flight experiments, development, or similar projects involving close scheduling and integration with other efforts.

Recommended Proposal Contents

1. *Cover Sheet*
2. *Table of contents*
3. *Prefatory material*

   The legal name and address of the university and specific division or campus identification if part of a larger organization;

   - Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;
   - Identification of any other organization, federal agency, or NASA installation to which the same proposal has been submitted;
   - Date of submission;
   - Signature of a responsible official or authorized representative of the university or a person authorized to contractually commit or obligate the university;
   - Identification of any NASA announcement with which the proposal is related or names of NASA individuals with whom preliminary discussions have been held;
   - Current grant, cooperative agreement, contract, or other agreement number if proposal is for continuation or renewal;
   - Amount requested of NASA, desired starting date, and duration of the project; and
   - A brief project title.

4. *Abstract*

   A concise (200-300 words) abstract describing the objective(s) of the proposed research effort and the method of approach.

5. *Project Description*

   The main body of the proposal should be a detailed statement of the work to be tives and expected significance, particularly in the context of the national aerospace effort; 2) relationship to the present

state of knowledge in the field; and 3) relationship to previous work done on the project and to related work in progress elsewhere. The statement should outline the general work plan, including the broad design of experiments to be undertaken and an adequate description of experimental methods and procedures. Any substantial collaboration with individuals not referred to in the budget or the use of consultants should be described.

When it is expected that the effort will require more than one year for completion, the proposals should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should, of course, be on the first year of work, and the description should distinguish clearly between the first year's work and the work planned for subsequent years.

6. *Personnel*

The principal investigator is responsible for direct supervision of the work and participates in the conduct of research whether he, she is or is not to be compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications, and any exceptional qualifications should be included. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list investigator(s), number of students or other assistants, together with information as to their level of academic attainment, and their race and sex. Any special industry-university cooperative arrangements which will enhance the project should be described.

7. *Facilities and Equipment*

Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and all additional major equipment that will be required. Identify any government-owned facilities, industrial plant equipment or special tooling which will be used on the project.

Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already with the university is a feasible alternative to purchase. Where such arrangements cannot be made, the proposal should so state. The need for items which typically can be used for both research and non-research purposes should be explained.

8. *Proposed Costs (Budget)*

Proposals should contain cost and technical parts in one volume. As applicable, include separate cost estimates for salaries and wages, fringe benefits, equipment, expendable materials and supplies, services, domestic and foreign travel, ADP expenses, publication or page charges, consultants, sub-contractors, other miscellaneous identifiable direct costs, and indirect costs. List salaries and wages in appropriate organizational categories; for instance, principal investigator, other scientific and engineering professionals, and graduate research assistants, technicians, and other non-professional personnel. Estimate all work force data in terms of work-months or fractions thereof.

Explanatory notes should accompany the budget to provide: identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and length of trips planned; basis for indirect cost computation and clarification of other items in the budget that are not self-explanatory. For renewals or continuations, include an estimate of any significant amount of unspent or uncommitted funds remaining at the completion of the current period of performance.

9. *Number of Copies*

Five (5) copies of the proposal should be submitted to fulfill processing and review requirements. Processing time will vary from two (2) to four (4) months depending on the number of technical and peer reviews required.

Prior technical discussions or technical correspondence may be transacted by direct contact with the respective Technical Monitor at NASA Headquarters or field centers.

Student Educational and Research Opportunities

Co-Op students from various universities working at NASA installations.

Cooperative Education Program (Co-op)

The program is designed to provide study-related work experience for students in two- and four-year colleges who are pursuing associate, baccalaureate and graduate curricula in fields related to NASA research. A majority of the co-op students are aerospace, electrical, and mechanical engineering majors. The program also includes accounting, business administration, mathematics, computer science, physics, life sciences and other fields of study.

Research Facilities. NASA's international reputation in aeronautics and space research is strongly associated with the excellence of its research facilities. Co-op students have at their disposal scientific laboratories, simulators, test structures, fabrication shops, advanced computer systems, and wind tunnels for research. Advancement and rotation of assignments provide the student the opportunity to work with different staff members and to be exposed to many of these unique facilities.

Work Assignments. Co-op students participate in various activities that apply the basic principles and theories of their major field of study. The co-op assignment provides an opportunity to determine the type of work for which the student is best suited, and provides the student and NASA an excellent means to assess future career decisions.

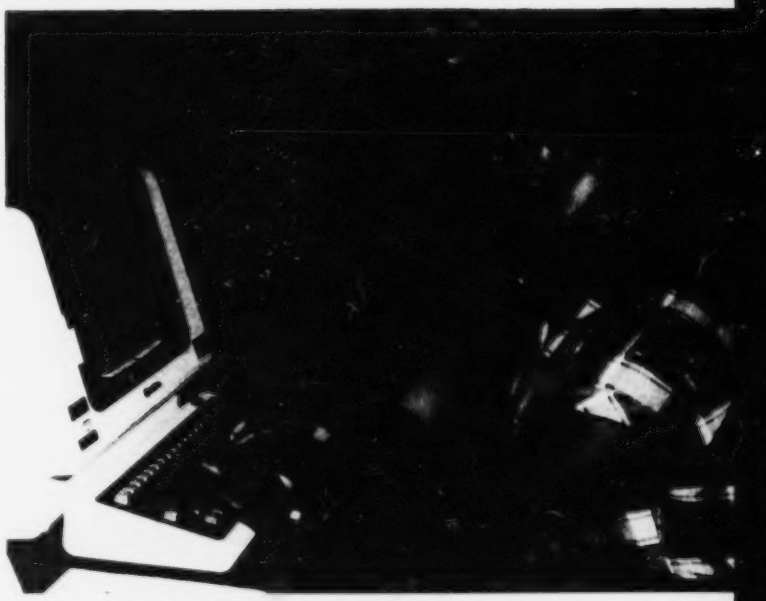
Co-ops in the fields of science and engineering enter a program of rotational work assignments that involve an increasing degree of difficulty. They work, under the supervision of an experienced professional,

in such areas as the operation of wind tunnels, research laboratories, test equipment, systems design, flight test experiments, and computer studies and simulation. The Co-op students' work is evaluated by their supervisor after each work assignment. By their last work period, many students are working with a minimum of supervision on complex research problems which may result in joint authorship of a research paper.

Citizenship. Students selected for this program must be citizens of the United States of America.

For additional information, please contact:

Ms. Eleanor M. Miller
Personnel Programs Division
National Aeronautics and Space Administration
Washington, DC 20546
202 453-2626



Graduate students conducting research using NASA Laboratory Facilities.

Graduate Student Researchers Program

The NASA Graduate Student Researchers Program is designed to significantly increase the number of highly trained scientists and engineers in aeronautics, space science, space applications, and space technology to meet the continuing needs of the national aerospace effort.

Each year NASA will provide an opportunity for about 80 graduate students in aerospace science and technology to conduct their thesis research at a NASA center. Selections will be made on the basis of a proposal by the student's faculty advisor in a research area identified by the NASA field centers.

Citizenship. Students selected for support under the NASA Graduate Student Researchers Program must be citizens of the United States of America.

Awards. Awards will be made for a one-year period and may be renewed annually, based on a performance evaluation by the faculty advisor and with concurrence by the NASA project monitor and NASA supervisor.

Basic Stipend. The basic stipend will be $12,000 per calendar year. The student will be encouraged to study on a full-time basis throughout the year.

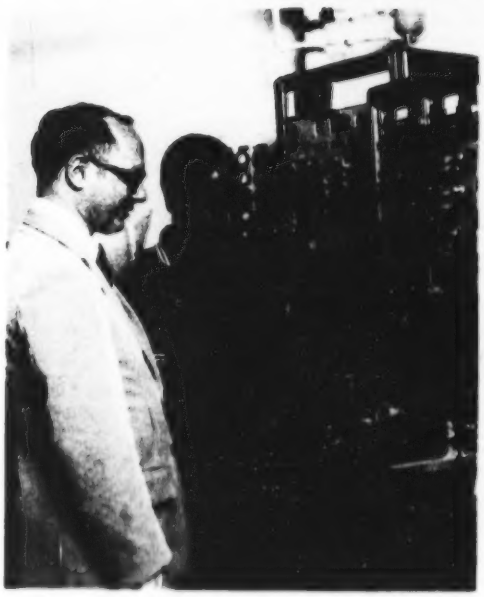
Student Allowance. A student will receive an additional subsistence allowance not to exceed $3,000 per calendar year, based on the percentage of time that is spent at the NASA center. These funds are to partially defray living expenses. Travel funds equivalent to a coach airline seat will be allowed to and from the university. Students living within close proximity of the NASA center will receive a nominal amount.

University Allowance. Funds may also be requested for the student's faculty advisor to travel to the NASA center to oversee the work. A maximum of $3,000 will be allowed for supervision of the program.

For additional information, please contact:

Mr. Frank C. Owens
Management Support Division
National Aeronautics and Space Administration
Washington, DC 20546
202/453-8348

Graduate students conducting research using NASA Laboratory Facilities.



Summer Faculty Fellowships

The Summer Faculty Fellowships Program is for U.S. citizens with teaching or research appointments in universities or colleges, preferably with two years of experience.

NASA supports a program of summer faculty fellowships for engineering and science educators. Faculty members spend ten weeks working with professional peers on research at NASA Centers.

The American Society for Engineering Education (ASEE) supervises the program, which is operated by co-directors from NASA centers and universities. ASEE provides coordination between the several institutions and NASA, as well as promotional and publication services.

The program's objectives are: (1) to further the professional knowledge of engineering and science faculty member; (2) to stimulate an exchange of ideas between participants and NASA; (3) to enrich and refresh the research and teaching activities of participants' institutions; and (4) to contribute to the research objectives of the NASA center.

Awards are made to engineering and science faculty members for summer research. Fellows will conduct projects of mutual interest to the fellow and the NASA center. Each fellow will work with a center colleague and will be associated directly with the aeronautics and space program. Special courses, seminars, workshops, lectures and similar activities are included in each cooperative program. Fellows may be invited to reapply for a second summer.

Faculty members contributing to mission research at NASA centers.

Fellowships: Stipends are $650 per week. Travel allowance will be paid. Approximately 150 first-year Fellowships will be awarded yearly.

For additional information, please contact:

Mr. Frank C. Owens
Management Support Division
National Aeronautics and Space Administration
Washington, DC 20546
202/453-8348

Institute for Computer Applications in Science & Engineering at LaRC (ICASE)

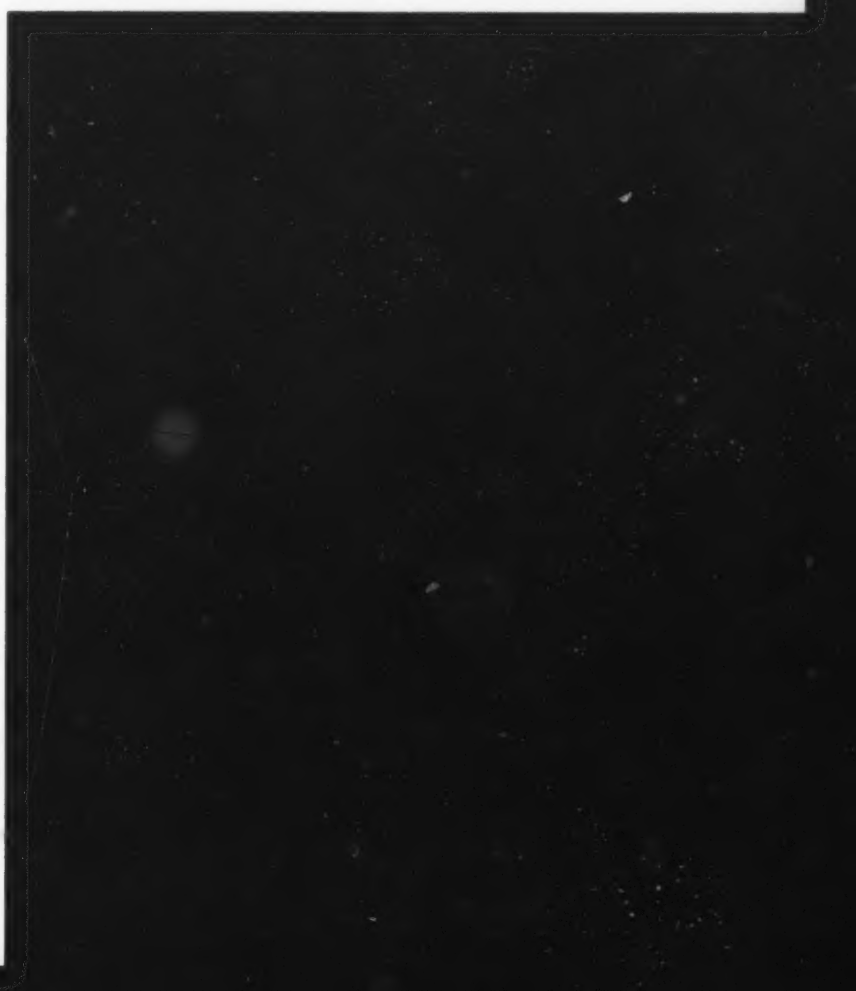
ICASE was established at the Langley Research Center for the purpose of:

- Providing a focal point with a university atmosphere to serve as a center of the academic community for activities related to applied mathematics, computer science, and the application of the computer to the solution of scientific and engineering problems.
- Conducting research in the disciplines of applied mathematics and applied computer science with the objective of better understanding the application of computers to scientific and engineering problems and the development of techniques for improving the problem solving efficiency of existing and future computers.
- Providing a mechanism to improve cooperative research involving government, industry, and academia in the solution of major systems problems requiring advanced computational facilities.
- Enhancing communication among scientists and engineers in universities, industries, and government agencies.
- Strengthening the ties between the general academic community and the staff and programs of the center.
- Assisting the center in developing further strength in the disciplines of applied mathematics and computer science.
- Stimulating interest among scientists and engineers in various disciplines in the use of advanced computation methods in their disciplines.

Distinguished faculty members and researchers are encouraged to participate in the ICASE Programs as visiting scholars.

For additional information, please contact:

Dr. Milton Rose
Langley Research Center
National Aeronautics and Space Administration
Hampton, VA 23665
804/865-2513



Computer generated pressure and temperature profiles.

National Research Council Resident Research Associateship Program

The National Research Council (NRC) conducts Resident Research Associateship programs (Postdoctoral and Senior Postdoctoral) on behalf of NASA. NRC Fellows are supported by funding allocated by NASA to the Council. Applications are received by the Associateship Office of the NRC, and are evaluated on a competitive basis by a peer review panel appointed by the President of the National Academy of Sciences. Fellows are selected solely by the panel.

The objectives of the program are to provide postdoctoral scientists and engineers opportunities for research on problems largely of their own choice and to contribute to the research effort of federal laboratories. An applicant in the program is responsible for the selection of a research problem of his/her own interest that relates to one of the research areas of interest to the laboratory in which he/she wishes to do research.

NRC Associateships are open to both citizens and noncitizens of the United States. Appointments of Regular Associates are made initially for one year; Senior Associates may be appointed for one year or for shorter periods.

Although applications for NRC/NASA Research Associateships will be accepted at any time, they will be evaluated in competition during certain periods. Completed applications for which the NRC has received official NASA endorsement by January 15, April 15, and August 15 will be reviewed for announcement of awards in March, July, and November, respectively. To ensure adequate time for processing by the NASA center and the National Research Council, applications should be submitted at least four to six weeks before the closing dates of January 15, April 15, and August 15.

For additional information, please contact:

Mr. Frank C. Owens
Management Support Division
National Aeronautics and Space Administration
Washington, DC 20546
202/453-8348

The Intergovernmental Mobility Program (Intergovernmental Personnel Act of 1970)

The Intergovernmental Mobility Program is a program whereby federal, state, and local governments can share personnel resources and thereby improve their service to the public. Under the Mobility Program, employees may be assigned to and from federal agencies, state, local, and Indian tribal governments, colleges and universities, and certain other organizations, for up to two (2) years. "Mobility assignees" work on priority projects, solve problems involving different levels of government, and build intergovernmental understanding.

Which Employees Can Participate

On the federal side: Employees in the federal career service.

On the non-federal side: Individuals employed for at least 90 days in a career position with a state, local, or Indian tribal government, institution of higher education, or other eligible organization.

Purposes of an Assignment

Assignments are made for work of mutual concern and benefit to the participating governments and institutions.

A mobility assignment can be made to:

- Share scarce expertise.
- Provide operating experience in a counterpart organization.
- Provide general developmental experience for the assignee.
- Improve management of programs and make more effective use of available resources.

NASA employee on mobility assignment to Fayetteville State University

- Strengthen intergovernmental understanding
- Transfer new technology or encourage the use of research findings

The overriding factors taken into account when mobility assignments are approved are the benefits to the participating organizations and the impact on the effective delivery of public services.

Travel and Transportation Expenses

Certain travel and relocation expenses may be authorized. When relocation expenses are authorized, a per diem at the assignment site may not be authorized.

Costs of the Assignment

All costs of an assignment may be shared by the federal and non-federal organization, or be paid entirely by one. This is subject to agreement between the two organizations. In general, an organization's share of the costs should correspond to the degree to which its interests are being met by the assignment.

For additional information, please contact:

Mr. John Moroney
Office of Development
National Aeronautics and Space Administration
Washington, DC 20546
202/453-2644

Aerospace Education Services projects are outreach programs designed to disseminate information and results of NASA research and development to teachers and students at all levels of the educational community.

These programs provide lecturers who share their expertise, demonstrations of equipment and materials to universities and school systems through workshops, seminars, and conferences. Included are career guidance programs with counselors and teachers at the secondary and university level, urban community enrichment programs for large city school systems, research programs for high school students to encourage aeronautics and space careers for minorities, science fairs, and the distribution on request of educational materials for use in the classroom.

Typical programs at most NASA centers are:

Aerospace Education Services Projects (Spacemobile)

Provides the professional services of a specialist in aerospace education. The specialists are qualified educators who are knowledgeable in aeronautics and the space sciences and are able to communicate NASA activities past, present and future. The project is a national program of free services to teachers, students and to general public. The goal is to increase awareness and understanding of scientific research and technological development and their place in the world in which we live.

Models and demonstration equipment for spacemobile lecture

Lunar Sample Education Program

Makes lunar samples available to science classrooms throughout the country on a free-loan basis. Borrowers receive six samples of lunar material (three soils and three rocks) encapsulated in a six inch diameter clear lucite disk. The disk is accompanied by written and graphic descriptions of each sample in the disk; a film; a sound and slide presentation; a teacher workbook; and additional printed material. This program is designed to be used as a science teaching aid in a classroom environment.

Teacher Workshops

Conducting teacher workshops and courses for pre and in service elementary and secondary school teachers during the summer is a primary objective of the Aerospace Education Services Project. While schools are in regular session, specialists strive to make teacher workshops a part of each educational service visit in a school.

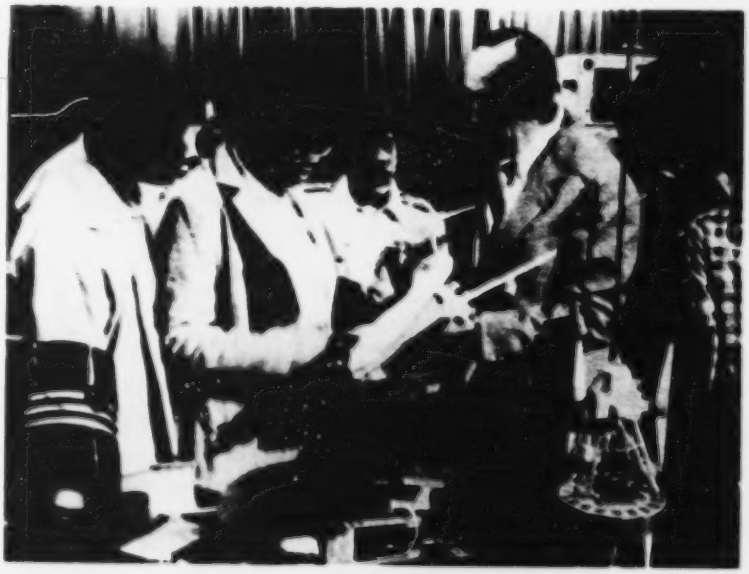
Community Involvement Programs

Programs are a concentration of NASA educational services in a particular community. They are planned and implemented at the invitation of and in cooperation with local school districts and community leaders.

Science Fair

NASA offered five Certificates of Outstanding achievement for aerospace-related projects at 233 U.S. regional and state science fairs affiliated with the International Science and Engineering Fair (ISEF). The center education offices provided additional recognition when possible.

Two students from each of the 305 affiliated fairs attended the ISEF, at which about 300 exhibits were considered for NASA awards. Eight students were awarded a NASA Certificate of Merit and an expense-paid trip to the STS-7 launch with their teachers. Ten other students received Honorable Mention recognition and a copy of *A Meeting with the Universe*, suitably inscribed.



NASA aerospace specialist demonstrating principles of flight.

Teachers in workshop studying data transmission.

NASA aerospace specialist discussing nutrition in space at teachers workshop

Explorer's Program

The purpose of the Explorer's Program is to stimulate the interest of students in science, engineering, mathematics, and technology by allowing them to explore a career in aeronautics, astronomy, computer science, and electronics. The objectives are to expose students to a scientific and technical environment, provide actual work experiences, and an opportunity to interact with scientists, engineers, and technicians and to assist students in developing interests and abilities in science, mathematics, and technology.

MathCounts

MathCounts is a national program which offers special coaching in mathematics followed by a series of competitions. The overall goal of the program is to improve mathematical skills and in some cases, accelerate the development of these skills.

Summer High School Apprenticeship Research Program (SHARP)

SHARP is an eight-week summer program which provides the opportunity for students to work with engineers or scientists in order to gain real life work experiences in a research environment.

NASA aerospace specialist showing space food used during shuttle flight

Short Courses—Secondary School Teachers

Centers offer courses to local science teachers in conjunction with the state departments of education. Courses are presented by center scientists or engineers, covering topics recommended by the state supervisor for science.

Teacher Research Room

The Room provides educators with copies of video tapes and slides relating to NASA's research and development programs. Educators select topics from a catalog and supply blank video tapes or slide film for copying and return by mail.

Speakers Bureau

The centers maintain a Speakers Bureau consisting of center employees who present lectures and audiovisual presentations to various public audiences. A large number of these presentations are made to educational groups.

Publications

Brochures, pamphlets, part sheets, lithographs and other publications are printed by the centers and distributed nationally.

Regional Film Library

The NASA centers have color films, slides, videotapes, audio cassettes and video disks describing various NASA research and devel-

NASA aerospace specialist explaining space suit to elementary students.

Students working flight simulators.

Student preparing experiment to be flown on space shuttle

opment programs and achievements in space. The materials may be borrowed for showings to education, civic, industrial, professional, youth and similar groups. There is no rental charge.

For additional information, please contact:

Mr. William D. Nixon
Educational Services Branch
National Aeronautics and Space Administration
Washington, DC 20546
202 453-8388

Space Shuttle Student Involvement Program

This program provides an opportunity for secondary school students to propose experiments suitable for possible flight aboard the Space Shuttle and, where appropriate, for performance by the astronauts. The National Science Teachers Association (NSTA) and the National Aeronautics and Space Administration have joined in conducting and sponsoring the Space Shuttle Student Involvement Program for Secondary Schools.

The purpose of the Space Shuttle Student Involvement Project (SSIP) is to stimulate interest in science and technology by directly involving secondary school students in a space research program.

For additional information, please contact:

Mr. Michael L. Bowie
Customer Services (MC)
National Aeronautics and Space Administration
Washington, DC 20546
202 453-2552

Bibliography

The following publications are sources of information on NASA's research interests, organizational structure, and administrative requirements.

- *Guidance for the Preparation and Submission of Unsolicited Proposals*, 1984 Edition. Available from Office of Procurement (Code H), NASA Headquarters, Washington, DC 20546.

- *Research and Technology Objectives Plans Summary*—describes currently authorized NASA research areas and responsible individuals. Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

- *NASA's University Program: Active Projects*—Describes current grants, cooperative agreements, and contracts. Issued annually. Available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

- *NASA Headquarters Telephone Directory*—Available from Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

- *The NASA Organization*—Describes roles and responsibilities of key headquarters and field center officials. Available from Management Processes Branch (Code NSM), NASA Headquarters, Washington, DC 20546.

- *NASA Program Plan*—Presents a 5-year plan for NASA's aeronautics and space program. Available from Management Support Division (Code LB), NASA Headquarters, Washington, DC 20546.

- *The United States Government Manual*—Provides summaries of agencies' purpose and role in the government. Available from Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

The following is a listing of HBCU's conducting research and training projects with NASA centers. These FY 1984 data are intended to show the prospective proposer the nature of the efforts, funding levels of the projects, and the involvement of students in the projects. We recommend that the proposer consult the most recent issue of the NASA publication "Research and Technology Objectives Plans Summary" and/or a NASA technical monitor to ascertain current research interests and needs of the Agency.

University Project	Center	FY 84 $ Amount	Students
Alabama A&M University (AL)			
Research and Training in Intelligent Robotic Systems	MSFC	193,645	5
Advanced Interactive Analytical Integration and Mission Planning Database for the Space Station	MSFC	97,995	5
High Energy Cosmic Ray Interactions in Emulsion	MSFC	58,231	2
Effects of Soil Moisture and Pertinent Soil Diagnostic Properties on Thermal Infrared and Reflectance Characteristics	NSTL	32,663	1
Development of Remote Sensing Techniques Capable of Delineating Soils as an Aid to Soil Survey	NSTL	99,931	8
Solution Growth of Crystals in Zero Gravity Experiment for Materials Processing in Space	MSFC	301,900	2
AXAF Technology Program Support: The Analysis of High Resolution X-Ray Scattering Measurements	MSFC	10,207	1
Atmospheric Effects on Coherent Laser Systems	MSFC	49,660	4
MSFC Development Program	MSFC	46,500	0
Subtotal		**890,732**	**28**

University Project	Center	FY 84 $ Amount	Students
Atlanta University (GA)			
Small Business Innovation Research Conference and Workshop	HQ	15,000	0
Inhomogeneous Stellar Media	LaRC	157,127	2
Subtotal		**172,127**	**2**
Bowie State College (MD)			
Design of Interactive Frame Based Cluttered Desktop System	GSFC	65,182	1
Training of Students in Engineering Related Subjects	GSFC	86,000	10
Holographic Gratings for Spectrographic Applications Study of Aberrations	GSFC	22,039	4
Training of Undergraduate Students in Sciences and Engineering	GSFC	104,082	16
Characterization of the Physico-Chemical Properties of Polymeric Materials for Aerospace Flights	GSFC	63,373	1
Subtotal		**340,676**	**32**

University Project	Center	FY 84 $ Amount	Students
Fisk University (TN)			
Thermal Characterization of Crystals	MSFC	66,000	2
Optical Characterization of Zero-Gravity Grown Crystals	MSFC	70,000	0
Subtotal		**136,000**	**2**
Florida A&M Univesity (FL)			
Relationship of Angiotensin Rhythms in Plasma and CNS to Neurogenic Hypertension	ARC	86,044	7
The Degradation of Hydrazine Monomethylhydrazine and Unsymmetrical Dimethlhydrazine by Microorganisms	KSC	78,994	2
A Study Entitled Influence of Biological Clock on Effects of Diazepam in Humans	JSC	69,980	0
Space Life Sciences Training Program	KSC	66,555	30
Study of Influence of Amines on Diurnal Toxicity of Stimulants and Depressants	ARC	123,400	7
Regulation of the Adrenal Cortex Function During Stress	ARC	82,168	4
Subtotal		**507,141**	**50**

University Project	Center	FY 84 $ Amount	Students
Hampton University (VA)			
Advanced Solar Energetics	LaRC	156,400	4
Direct Solar Pumped Iodine Laser Amplifier	LaRC	40,092	2
Architectural Design of a Continuously Manned Space Station: Individual and Total Architectural Configuration	LaRC	117,447	3
Electron Transport and Charge Buildup in Multilayered Configurations	LaRC	22,573	2
Radiative Transfer Model for Remote Sensing of Laser Induced Fluorescence of Phytoplankton in Non-Homogeneous Turbid Waters	HQ	56,131	1
Summer Faculty Fellowship Program in Research	HQ	364,991	0
Subtotal		757,634	12

University Project	Center	FY 84 $ Amount	Students
Howard University (DC)			
An Experiment in the Development of Fault Tolerant Applications Software	LaRC	124,132	2
Development of Epitaxial Cubic Silicon Carbide	LeRC	250,000	2
Real-Type Observations of X-Ray Diffraction Patterns	GSFC	10,000	1
Snow Cover, Snowmelt and Runoff in the Himalayan River Basins	GSFC	85,800	2
Large Space Structures Institute	LaRC	500,000	6
Research Relative to a Class of Optically Controlled Millimeter Wave Devices	GSFC	49,924	1
An Integrated Laboratory and Observational Study of the Inner Coma of Halley's Comet	HQ	129,764	2
Teacher Engineering Orientation Program	GSFC	20,041	0
A Simulation Network for Electrical Engineering	GSFC	260,300	3
Summer Faculty Fellowship Program in Research	HQ	278,890	0
NASA Graduate Student Researchers Program	HQ	21,032	2
The Dynamics and Control of Large Flexible Space Structures	LaRC	42,778	1
Laser Induced Photoluminescence Studies of Primary Photochemical Production Processes of Cometary Radicals	HQ	55,000	1
Subtotal		**2,012,481**	**26**

University Project	Center	FY 84 $ Amount	Students
Jackson State University (MS)			
Electronic Spectroscopy of Molecular Ions	HQ	115,010	2
Subtotal		115,010	2
Lincoln University (PA)			
Development of Computer-Aided Medical Information Management Systems	GSFC	300,000	13
Introduction to Aero Space Engineering	GSFC	120,000	12
Subtotal		420,000	25

University Project	Center	FY 84 $ Amount	Students
Morgan State University			
A Magnetomineral Study of Exsolation in Titanomagnetites	GSFC	94,388	1
The Investigation, Identification, Analysis and Interpretation of New Possibilities in Transfer Technology	GSFC	21,967	5
Graduate Student Research Program	GSFC	56,500	12
Subtotal		172,855	18
Norfolk State University			
Carbon-13 Nuclear Magnetic Resonance in Graphite Epoxy Composites: The Potential for Characterizing the Fiber-Matrix Interface	LaRC	47,842	3
Subtotal		47,842	3

University Project	Center	FY 84 $ Amount	Students
North Carolina A&T State University (NC)			
Heteroepitaxial Growth of III-V Semiconductor Compounds by Metal-Organic Chemical Vapor Deposition for Device Applications	LaRC	49,575	1
Effect of Fatigue and Thermal Loads on Graphite Fiber-Reinforced Glass Matrix Composites	LaRC	130,149	5
Dynamics and Control of Orbiting Grid Structures and the Synchronously Deployable Beam	LaRC	164,823	2
Study of the Effect of Non-Sand-Grain Surface Roughness on Heat Transfer and Drag in Subsonic Boundary Layer Flow	LaRC	91,829	2

University Project	Center	FY 84 $ Amount	Students
Mid-Infrared Laser Heterodyne Spectroscopy System Packaging Using Flexible Waveguides	LaRC	36,236	1
Development of Computer Models for Correlating Data of Film Cooling of Nose Cone under Hypersonic Flow	LaRC	92,015	2
A Study of Reactive Plasma Depositioned Thin Films	LaRC	198,558	6
North Carolina A&T Student Space Shuttle Program/Design Phase	ARC	64,091	28
Material Growth and Characterization of III-V Compounds for Solid State Devices	LaRC	175,000	3
Subtotal		1,002,276	50

University Project	Center	FY 84 $ Amount	Students
Prairie View A&M University (TX)			
Charged Particle Radiation Damage to Material and VLSI Devices	JSC	365,606	6
Subtotal		365,606	6
Southern University and A&M College (LA)			
Automation of NASA Headquarters Resources Management	HQ	93,910	2
Development, Administration and Evaluation of Transportable College Level Courses in the Access of the NASA/RECON System	HQ	149,214	2
Subtotal		243,124	4
Tennessee State University (TN)			
Graduate and Undergraduate Aerospace Fellowship Program	LeRC	35,554	9
Study of the Wear Process in the Space Shuttle Main Engine (SSME) High Pressure Oxygen Turbo Pump Ball Bearings	MSFC	220,000	2
Subtotal		255,554	11

University Project	Center	FY 84 $ Amount	Students
Tuskegee Institute (AL)			
Characterization of Polymer Adhesives for Composites	LaRC	99,593	1
Characterization of Advanced Electric Propulsion Systems	LeRC	62,822	1
Graduate and Undergraduate Aerospace Fellowship Program	LeRC	54,643	9
Morphometrics of Cellular Damage in Mice Receiving Whole Body Irradiation	ARC	55,000	0
NASA Graduate Student Researchers Program	HQ	15,000	1
Subtotal		**287,058**	**12**

University Project	Center	FY 84 $ Amount	Students
University of the District of Columbia (DC)			
A Saturday Academy in Engineering, Mathematics and Computer Science for Academically Talented Students from the Metropolitan Washington Area	HQ	191,840	13
Subtotal		191,840	13
University of Maryland—Eastern Shore (MD)			
Engineering and Pre-Engineering Activities	GSFC	110,000	12
Subtotal		110,000	12
TOTAL		**$8,027,956**	**308**